

loss or retrievable with EDR data extraction tools.

*X-direction* means in the direction of the vehicle X-axis, which is parallel to the vehicle's longitudinal centerline. The X-direction is positive in the direction of forward vehicle travel.

*Y-direction* means in the direction of the vehicle Y-axis, which is perpendicular to its X-axis and in the same horizontal plane as that axis. The Y-direction is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

*Z-direction* means in the direction of the vehicle Z-axis, which is perpendicular to the X- and Y-axes. The Z-direction is positive in a downward direction.

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#### § 563.6 Requirements for vehicles.

Each vehicle equipped with an EDR must meet the requirements specified in § 563.7 for data elements, § 563.8 for data format, § 563.9 for data capture, § 563.10 for crash test performance and survivability, and § 563.11 for information in owner's manual.

#### § 563.7 Data elements.

(a) *Data elements required for all vehicles.* Each vehicle equipped with an EDR must record all of the data elements listed in Table I, during the interval/time and at the sample rate specified in that table.

TABLE I.—DATA ELEMENTS REQUIRED FOR ALL VEHICLES EQUIPPED WITH AN EDR

Data element	Recording interval/time <sup>1</sup> (relative to time zero)	Data sample rate samples per second
Delta-V, longitudinal	0 to 250 ms	100
Maximum delta-V, longitudinal	0–300 ms	N.A.
Time, maximum delta-V	0–300 ms	N.A.
Speed, vehicle indicated	–5.0 to 0 sec	2
Engine throttle, % full (or accelerator pedal, % full)	–5.0 to 0 sec	2
Service brake, on/off	–5.0 to 0 sec	2
Ignition cycle, crash	–1.0 sec	N.A.
Ignition cycle, download	At time of download	N.A.
Safety belt status, driver	–1.0 sec	N.A.
Frontal air bag warning lamp, on/off	–1.0 sec	N.A.
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, driver.	Event	N.A.
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, right front passenger.	Event	N.A.
Multi-event, number of events (1,2)	Event	N.A.
Time from event 1 to 2	As needed	N.A.
Complete file recorded (yes, no)	Following other data	N.A.

<sup>1</sup> Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is –0.1 to 1.0 sec (e.g., T = –1 would need to occur between –1.1 and 0 seconds.)

(b) *Data elements required for vehicles under specified conditions.* Each vehicle equipped with an EDR must record each of the data elements listed in column 1 of Table II for which the vehicle

meets the condition specified in column 2 of that table, during the interval/time and at the sample rate specified in that table.

TABLE II.—DATA ELEMENTS REQUIRED FOR VEHICLES UNDER SPECIFIED CONDITIONS

Data element name	Condition for requirement	Recording interval/ time <sup>1</sup> (relative to time zero)	Data sample rate (per second)
Lateral acceleration	If recorded <sup>2</sup>	0–250 ms	500
Longitudinal acceleration	If recorded	0–250 ms	500
Normal acceleration	If recorded	0–250 ms	500
Delta-V, lateral	If recorded	0–250 ms	100
Maximum delta-V, lateral	If recorded	0–300 ms	N.A.
Time maximum delta-V, lateral	If recorded	0–300 ms	N.A.
Time for maximum delta-V, resultant	If recorded	0–300 ms	N.A.
Engine rpm	If recorded	–5.0 to 0 sec	2

TABLE II.—DATA ELEMENTS REQUIRED FOR VEHICLES UNDER SPECIFIED CONDITIONS—Continued

Data element name	Condition for requirement	Recording interval/ time <sup>1</sup> (relative to time zero)	Data sample rate (per second)
Vehicle roll angle .....	If recorded .....	– 1.0 up to 5.0 sec <sup>3</sup>	10
ABS activity (engaged, non-engaged) .....	If recorded .....	– 5.0 to 0 sec .....	2
Stability control (on, off, engaged) .....	If recorded .....	– 5.0 to 0 sec .....	2
Steering input .....	If recorded .....	– 5.0 to 0 sec .....	2
Safety belt status, right front passenger (buckled, not buckled) ..	If recorded .....	– 1.0 sec .....	N.A.
Frontal air bag suppression switch status, right front passenger (on, off, or auto).	If recorded .....	– 1.0 sec .....	N.A.
Frontal air bag deployment, time to n <sup>th</sup> stage, driver <sup>4</sup> .....	If equipped with a driver's frontal air bag with a multi- stage inflator.	Event .....	N.A.
Frontal air bag deployment, time to n <sup>th</sup> stage, right front pas- senger <sup>4</sup> .	If equipped with a right front pas- senger's frontal air bag with a multi- stage inflator.	Event .....	N.A.
Frontal air bag deployment, n <sup>th</sup> stage disposal, driver, Y/N (whether the n <sup>th</sup> stage deployment was for occupant restraint or propellant disposal purposes).	If recorded .....	Event .....	N.A.
Frontal air bag deployment, n <sup>th</sup> stage disposal, right front pas- senger, Y/N (whether the n <sup>th</sup> stage deployment was for occu- pant restraint or propellant disposal purposes).	If recorded .....	Event .....	N.A.
Side air bag deployment, time to deploy, driver .....	If recorded .....	Event .....	N.A.
Side air bag deployment, time to deploy, right front passenger ..	If recorded .....	Event .....	N.A.
Side curtain/tube air bag deployment, time to deploy, driver side	If recorded .....	Event .....	N.A.
Side curtain/tube air bag deployment, time to deploy, right side	If recorded .....	Event .....	N.A.
Pretensioner deployment, time to fire, driver .....	If recorded .....	Event .....	N.A.
Pretensioner deployment, time to fire, right front passenger .....	If recorded .....	Event .....	N.A.
Seat track position switch, foremost, status, driver .....	If recorded .....	– 1.0 sec .....	N.A.
Seat track position switch, foremost, status, right front pas- senger.	If recorded .....	– 1.0 sec .....	N.A.
Occupant size classification, driver .....	If recorded .....	– 1.0 sec .....	N.A.
Occupant size classification, right front passenger .....	If recorded .....	– 1.0 sec .....	N.A.
Occupant position classification, driver .....	If recorded .....	– 1.0 sec .....	N.A.
Occupant position classification, right front passenger .....	If recorded .....	– 1.0 sec .....	N.A.

<sup>1</sup> Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is – 0.1 to 1.0 sec (e.g. T = – 1 would need to occur between – 1.1 and 0 seconds.)

<sup>2</sup> “If recorded” means if the data is recorded in non-volatile memory for the purpose of subsequent downloading.

<sup>3</sup> “Vehicle roll angle” may be recorded in any time duration, – 1.0 sec to 5.0 sec is suggested.

<sup>4</sup> List this element n – 1 times, once for each stage of a multi-stage air bag system.

### § 563.8 Data format.

(a) The data elements listed in Tables I and II, as applicable, must be re-

corded in accordance with the range, accuracy, resolution, and filter class specified in Table III.

TABLE III.—RECORDED DATA ELEMENT FORMAT

Data element	Range	Accuracy	Resolution	Filter class
Lateral acceleration .....	– 50 g to + 50 g .....	±5% .....	0.01 g .....	SAE J211–1, <sup>1</sup> Class 60.
Longitudinal acceleration .....	– 50 g to + 50 g .....	±5% .....	0.01 g .....	SAE J211–1, <sup>1</sup> Class 60.
Normal Acceleration .....	– 50 g to + 50 g .....	±5% .....	0.01 g .....	SAE J211–1, <sup>1</sup> Class 60.
Longitudinal delta-V .....	– 100 km/h + 100 km/h.	±5% .....	1 km/h .....	N.A.
Lateral delta-V .....	– 100 km/h to + 100 km/h.	±5% .....	1 km/h .....	N.A.
Maximum delta-V, longitudinal ...	+ 100 km/h + 100 km/h.	±5% .....	1 km/h .....	N.A.
Maximum delta-V, lateral .....	– 100 km/h to + 100 km/h.	±5% .....	1 km/h .....	N.A.
Time, maximum delta-V, longitudinal.	0–300 ms .....	±3 ms .....	2.5 ms .....	N.A.
Time, maximum delta-V, lateral	0–300 ms .....	±3 ms .....	2.5 ms .....	N.A.